times swept over New England at the close of the month. Further notice of its severity is reserved for the February issue.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Tornadoes.—Tornadoes have occurred in January in some parts of the United States south of the thirty-eighth parallel in five out of the last ten years.

The tornado which wrought so great destruction of life and property at Fort Smith on the 12th, an account of which appears elsewhere in this REVIEW, does not seem to have been unusually severe or unlike tornadoes that have hitherto been experienced in January. Unfortunately it passed directly through the business and residence portion of the chief city of western Arkansas. Three other storms were observed during the month having the characteristics of tornadoes. The details of each follow:

(1) January 9, 3:50 p. m. (central time), Morganfield, Ky.: One killed; property loss from $12,000 to $18,000. Path of great destruction 30 to 40 feet wide, 750 feet long; moved northeast.

(2) January 12, 12:42 a. m. (local time), Fort Smith, Ark.: Thirty-three killed outright, 19 died from injuries; 73 injured; property loss $450,000. Path of great destruction 300 feet wide, 1 mile long; moved east, 17° north.

(3) January 11, 11 p. m. (central time), Bradleyville, Mo.: One killed, 5 injured; property loss, $3,000. Path of great destruction 300 yards wide 5 miles long; moved northeast. Bradleyville, Mo., is about 125 miles due northeast of Fort Smith, Ark. It would, therefore, appear that the conditions were favorable for the development of tornadoes throughout the central portion of the low area that formed over Arkansas and Missouri on the night of the 11–12th.

(4) January 16, 7 p. m. (central time), Maud, Okla.: No loss of life; 6 buildings destroyed. Path of storm 300 feet wide, length unknown; moved toward the northeast.

SUNSHINE AND CLOUDINESS.

The quantity of sunshine, and therefore of heat, received by the atmosphere as a whole is very nearly constant from year to year, but the proportion received by the surface of the earth depends upon the absorption by the atmosphere, and varies largely with the distribution of cloudiness. The sunshine is now recorded automatically at 21 regular stations of the Weather Bureau by its photographic, and at 47 by its thermal effects. The photographic record sheets show the apparent solar time, but the thermometric records show seventy-fifth meridian time; for convenience the results are all given in Table IX for each hour of local mean time. In order to complete the record of the duration of cloudiness these registers are supplemented by special personal observations of the state of the sky near the sun in the hours after sunrise and before sunset, and the cloudiness for these hours has been added as a correction to the instrumental records, whence there results a complete record of the duration of sunshine from sunrise to sunset.

The average cloudiness of the whole sky is determined by numerous personal observations at all stations during the daytime, and is given in the column "average cloudiness" in Table I; its complement, or percentage of clear sky, is given in the last column of Table IX for the stations at which instrumental self-registers are maintained.

The percentage of clear sky (sunshine) for all of the stations included in Table I, obtained as described in the preceding paragraph, is graphically shown on Chart VII. The regions of cloudy and overcast skies are shown by heavy shading; an absence of shading indicates, of course, the prevalence of clear, sunshiny weather. The formation of fog and cloud is primarily due to differences of temperature in a relatively thin layer of air next to the earth's surface. The relative position of land and water surfaces often greatly increases the tendency to form areas of cloud and fog. This principle is perhaps better exemplified in the Lake Region than elsewhere, although it is of quite general application. The percentage of sunshine on the lee shores of the Lakes is always much less than on the windward shores. Next to the permanent influences that tend to form fog and cloud may be classed the frequency of the passage of cyclonic areas. The greater number of such areas during the current month moved from Texas to the Lake Region by way of the Mississippi and Ohio valleys. As might be expected, an area of diminished sunshine appears on the chart almost coincident with the average path of the cyclonic storms of the month. It is to be noticed, moreover, that the percentage of sunshine diminishes rapidly as the Lake Region is approached, particularly in the Ohio Valley.

The stations that have the least sunshine are Rochester, Grand Haven, Erie, Pittsburg, Parkersburg, Buffalo, Sandusky, and Oswego; the greatest are Yuma, Key West, Tampa, Lander, Yankton, Bismarck, Redbluff, Pierre, North Platte, San Diego, Williston, El Paso, and Jupiter.

The average cloudiness by geographic districts, and the departure from the normal conditions are given in the table below. The mean values have been computed from the numerical data of Table I.

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	5.6	−0.2	Missouri Valley	5.0	−0.1
Middle Atlantic	6.2	+0.6	Northern Slope	4.3	−0.3
South Atlantic	4.8	−0.5	Middle Slope	4.9	+1.1
Florida Peninsula	3.3	−1.4	Southern Slope	4.6	+0.8
East Gulf	5.7	+0.1	Southern Plateau	3.8	+0.9
West Gulf	5.9	+0.5	Middle Plateau	4.9	+0.1
Ohio Valley and Tennessee	6.8	+0.4	Northern Plateau	6.8	−0.5
Lower Lake	8.0	+0.5	North Pacific Coast	7.5	+0.4
Upper Lake	6.8	0.0	Middle Pacific Coast	4.8	−0.3
North Dakota	4.0	−0.7	South Pacific Coast	4.6	+0.5
Upper Mississippi Valley	5.5	+0.2			

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IX, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—The dates on which the number of reports of thunderstorms for the whole country were most numerous were: 25th, 223; 11th, 141; 12th, 128; 22d, 81; and 9th, 78.

Reports were most numerous from Missouri, 109; Ohio, 105; Indiana, 85; and Arkansas, 75.

In Canada.—Thunderstorms were reported at Grand Manan, 23d; Yarmouth, 13th, 23d; Toronto and Port Stanley, 12th.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, from the 3d to the 11th, inclusive.

The greatest number of reports were received for the following dates: 16th, 26; 18th, 15; 17th, 9.

Reports were most numerous from Montana, 13; North Dakota, 13; Illinois, 7; Minnesota and Ohio, 6 each.

In Canada.—Auroras were reported as follows: Father Point, 17, 18, 25; Port Arthur, 1, 19; Winnipeg, 16, 18; Minnedosa, 1, 10, 16, 17, 20, 25, 28; Qu'Appelle, 16, 21, 22; Medicine, Hat, 16; Swift Current, 17, 26; Prince Albert, 25; Battleford, 16, 26.